

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference 130109.526PC	FOR FURTHER ACTION	See item 4 below
International application No. PCT/US2005/011822	International filing date (<i>day/month/year</i>) 04 April 2005 (04.04.2005)	Priority date (<i>day/month/year</i>) 05 April 2004 (05.04.2004)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant BALLARD POWER SYSTEMS INC		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).

2. This REPORT consists of a total of 10 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

- | | | |
|-------------------------------------|--------------|---|
| <input checked="" type="checkbox"/> | Box No. I | Basis of the report |
| <input type="checkbox"/> | Box No. II | Priority |
| <input checked="" type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input checked="" type="checkbox"/> | Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> | Box No. VI | Certain documents cited |
| <input type="checkbox"/> | Box No. VII | Certain defects in the international application |
| <input checked="" type="checkbox"/> | Box No. VIII | Certain observations on the international application |

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

	Date of issuance of this report 07 November 2006 (07.11.2006)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Simin Baharlou e-mail: pt09@wipo.int

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/US2005/011822

International filing date (day/month/year)
05.04.2005

Priority date (day/month/year)
05.04.2004

International Patent Classification (IPC) or both national classification and IPC
INV. H01M8/04 H01M8/24

Applicant
BALLARD POWER SYSTEMS INC

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



European Patent Office - P.B. 5818 Patentlaan 2
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Date of completion of
this opinion

see form
PCT/ISA/210

Authorized Officer

Kelly, M

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**International application No.
PCT/US2005/011822

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

- ☒ the international application in the language in which it was filed
- ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material:

- ☐ a sequence listing
- ☐ table(s) related to the sequence listing

b. format of material:

- ☐ on paper
- ☐ in electronic form

c. time of filing/furnishing:

- ☐ contained in the international application as filed.
- ☐ filed together with the international application in electronic form.
- ☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**International application No.
PCT/US2005/011822**Box No. III Non-establishment of opinion with regard to novelty, inventive step and Industrial
applicability**

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of

- ☐ the entire international application
- ☒ claims Nos. 43-47

because:

- ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international search (*specify*):
- ☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):
- ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed (*specify*):
- ☒ no international search report has been established for the whole application or for said claims Nos. 43-47
- ☐ a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:
 - ☐ furnish a sequence listing on paper complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.
 - ☐ furnish a sequence listing in electronic form complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.
 - ☐ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rules 13ter.1(a) or (b).
- ☐ a meaningful opinion could not be formed without the tables related to the sequence listings; the applicant did not, within the prescribed time limit, furnish such tables in electronic form complying with the technical requirements provided for in Annex C-bis of the Administrative Instructions, and such tables were not available to the International Searching Authority in a form and manner acceptable to it.
- ☐ the tables related to the nucleotide and/or amino acid sequence listing, if in electronic form only, do not comply with the technical requirements provided for in Annex C-bis of the Administrative Instructions.
- ☐ See Supplemental Box for further details

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**International application No.
PCT/US2005/011822**Box No. IV Lack of unity of invention**

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has, within the applicable time limit:
- ☐ paid additional fees
 - ☐ paid additional fees under protest and, where applicable, the protest fee
 - ☐ paid additional fees under protest but the applicable protest fee was not paid
 - ☒ not paid additional fees
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- ☐ complied with
 - ☒ not complied with for the following reasons:
see separate sheet
4. Consequently, this report has been established in respect of the following parts of the international application:
- ☐ all parts.
 - ☒ the parts relating to claims Nos. 1-42

Box No. V Reasoned statement under Rule 43b/s.1(a)(I) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-42
	No: Claims	
Inventive step (IS)	Yes: Claims	1-42
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-42
	No: Claims	

2. Citations and explanations

see separate sheet

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2005/011822

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/US2005/011822

1. Reference is made to the following document:
D1: US 2002/102452 A1 (REISER CARL A ET AL) 1 August 2002 (2002-08-01)
cited in the application

Re Item IV

Lack of unity of invention

2. Specification according to Rule 40.1 PCT of the reasons for which the international application PCT/US2005/011822 is not considered as complying with the requirement of unity of invention according to Art. 3(4)(iii) PCT and Rule 13 PCT.

According to the PCT International Search and Examination Guidelines, Part III, 10.06 (as in force from March 25, 2004), unity of invention has to be considered in the first place only in relation to the independent claims.

There are 6 independent claims:

Claims 1, 20, 41 and 42: A method of operating a fuel cell system, a fuel cell system and a vehicle comprising a fuel cell system, the fuel cell system comprising a fuel supply passage and an oxidant supply passage; the fuel supply passage comprising an anode inlet for directing a fuel stream to the fuel cell stack; the oxidant supply passage comprising a cathode inlet for directing an oxidant stream to the fuel cell stack; and an enclosure disposed around the fuel cell stack, the enclosure comprising an enclosure inlet passage in fluid communication with the interior of the enclosure for introducing oxidant into the enclosure; and an enclosure outlet passage fluidly connected to the cathode inlet, for directing oxidant out of the enclosure and to the cathode inlet.

Claims 43 and 46: A fuel cell system and a purging device for a fuel cell system, the purging device comprising a retention vessel comprising an inlet, an outlet and means for drawing an amount of fuel exhaust into the purging device via the inlet when operated in a first mode and for expelling the fuel exhaust out of the purging device via the outlet when operated in a second mode.

It appears that within these groups of independent claims unity does not exist for the following reasons:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/US2005/011822

A) The "same" or "corresponding" technical feature between these independent claims is a fuel cell system.

This feature is already known from D1 (abstract).

Therefore, this feature is not a special (new and inventive) technical feature. Thus, no "same" or "corresponding" special technical features could be found between the groups of independent claims, as required by Rule 13.2 PCT.

B) Also the common problem underlying the invention, to provide improved management of fuel releases, is already known, see D1 (p.1, §4).

No other common problem could be found which could serve as the general inventive concept required by Rule 13.1 PCT.

Consequently these claims are not unitary according to Rule 13.

C) Thus the application is split into 2 groups of (alleged) inventions:

Group I: Claims 1-42

Group II: Claims 43-47

According to Article 17(3)(a) PCT the ISA shall establish the International Search Report on those parts of the International Application which relate to the invention first mentioned in the claims 1-42, i.e., the above mentioned group I.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

3. Novelty

A method of operating a fuel cell system, the fuel cell system comprising an enclosure and a fuel cell stack disposed inside the enclosure, the method comprising: supplying fuel to the stack via an anode inlet; supplying oxidant to the enclosure; circulating the oxidant within the enclosure to mix any fuel present in the enclosure; withdrawing circulated oxidant from the enclosure; and supplying at least a portion of the circulated oxidant withdrawn from the enclosure to the stack via a cathode, is not disclosed in any cited prior art.

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/US2005/011822

Therefore the subject-matter of claims 1, 20, 41 and 42 is new (Article 33(2) PCT).

4. Inventive Step

The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and discloses (the references in parentheses applying to this document):

A method of operating a fuel cell system, the fuel cell system comprising an enclosure and a fuel cell stack disposed inside the enclosure, the method comprising: supplying fuel to the stack via an anode inlet; supplying oxidant to the enclosure; circulating the oxidant within the enclosure to mix with any fuel present in the enclosure; and supplying at least a portion of the circulated oxidant to the stack via a cathode (D1: abstract; p.1, §4 to p.2, §16).

The subject-matter of claim 1 therefore differs from this known D1 in that: the circulated oxidant is withdrawn from the enclosure and supplied to the stack via a cathode.

The problem to be solved by the present invention may therefore be regarded as providing improved management of fuel releases from fuel cell systems by ensuring adequate mixing of air and fuel before supply to the cathode.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

Starting out from D1 it is not obvious to the skilled person to withdraw the circulated oxidant from the enclosure and supply to the stack via a cathode in order to ensuring adequate mixing of air and fuel before supply to the cathode.

The same reasoning applies, *mutatis mutandis*, to the subject-matter of the corresponding independent claims 20, 41 and 42, which therefore are also considered inventive.

Claims 2-19, 21-40 are dependent on claims 1 and 20 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

Re Item VIII

Certain observations on the international application

5. Although claims 20 and 42 have been drafted as separate independent claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought and in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack conciseness and as such do not meet the requirements of Article 6 PCT.

The vague and imprecise statement in the description on page 12, lines 6-10 implies that the subject-matter for which protection is sought may be different to that defined by the claims, thereby resulting in lack of clarity (Article 6 PCT) when used to interpret them.